

**PATENT**

Atty Docket No.: 100110202-1

App. Ser. No.: 10/062,443

**IN THE CLAIMS:**

*Please find below a listing of all of the pending claims. The statuses of the claims are set forth in parentheses.*

1. (Currently amended) A system for cooling at least one computer component, said system comprising:

a plurality of cold plates adapted to transfer heat from a plurality of computer components to a cooling fluid, wherein the cooling fluid flows through respective interiors of the plurality of cold plates;

a supply line to supply said cooling fluid into, and out from, said plurality of cold plates; and

a housing having one or more racks configured to support said plurality of computer components, said one or more racks further configured to support said plurality of cold plates in thermal communication with said plurality of computer components.

2. (Currently amended) The system of claim 1, further comprising:

a heat exchanger adapted to transfer heat from [[a]] the cooling fluid to a medium, to thereby cool the cooling fluid.

3. (Currently amended) The system of claim 1, further comprising:

~~a heat exchanger adapted to transfer heat from the cooling fluid to another fluid~~ a plurality of controllable valves positioned along the supply line to control the flow of cooling fluid into each of the plurality of cold plates.

## PATENT

Atty Docket No.: 100110202-1  
App. Ser. No.: 10/062,443

4. (Currently amended) The system of claim 1, further comprising:  
an electronic controller configured to control the supply of cooling fluid into each of the plurality of cold plates.

5. (Currently amended) The system of claim 4, wherein said electronic controller is configured to modulate the cooling of at least one of said computer components based upon the cooling fluid supplied to each of the plurality of cold plates.

6. (Currently amended) The system of claim ~~[[1]]~~2, further comprising:  
a chilled water supply, wherein the medium comprises chilled water and wherein the heat exchanger is configured to receive chilled water from the chilled water supply; and  
a controllable valve configured to modulate the supply of water from ~~[[a]]~~the chilled water supply to thereby vary the transfer of heat from the cooling fluid to the chilled water;  
~~and means for connecting a chilled water supply to a heat exchanger.~~

7. (Currently amended) The system of claim 6, wherein said controllable valve is adapted to modulate a supply of liquid water from ~~[[a]]~~the chilled ~~liquid water~~ supply in response to instructions from an electronic controller.

8. (Currently amended) The system of claim ~~[[1]]~~4, further comprising:  
~~at least one controllable valve to modulate the flow of said cooling fluid through the supply line~~ a plurality of controllable valves positioned along the supply line to control the flow of cooling fluid into the plurality of cold plates;

## PATENT

Atty Docket No.: 100110202-1

App. Ser. No.: 10/062,443

wherein the electronic controller is configured to operate the plurality of controllable valves to control the supply of cooling fluid into each of the plurality of cold plates.

9. (Original) The system of claim 1, further comprising:

a fluid reservoir attached to said supply line; and

one or more pumps operable to circulate the fluid.

10. (Currently amended) The system of claim ~~[[1]]~~4, further comprising:

a self-contained unit in the form of a single chassis a temperature gauge for detecting temperature of at least one of the cooling fluid, a cold plate, and the at least one computer component, and wherein the electronic controller is configured to control the supply of cooling fluid into each of the plurality of cold plates based upon the temperature detected by the temperature gauge.

11. (Currently amended) The system of claim ~~[[1]]~~4, further comprising:

a sensor configured to measure the power consumption of ~~[[a]]~~the at least one computer component; and

wherein the electronic controller is configured to control the supply of cooling fluid into each of the plurality of cold plates based upon the power consumption of the at least one computer component measured by the sensor.

## PATENT

Atty Docket No.: 100110202-1  
App. Ser. No.: 10/062,443

12. (Currently amended) A system for cooling ~~at least one~~ a plurality of computer components, said system comprising:

a plurality of means for absorbing heat from the plurality of computer components;

~~means for holding a plurality of computer boards~~ the plurality of computer

components in thermal attachment with the plurality of means for absorbing heat;

means for supplying cooling fluid into the plurality of means for absorbing heat,

wherein the means for supplying cooling fluid is configured to variably supply cooling fluid into the plurality of means for absorbing heat.

~~electronic connection means for providing electrical power to the computer boards;~~

~~communication connection means for providing communication between the~~

~~computer boards and an apparatus external to the system;~~

~~a plurality of cold plates, each cold plate being adapted to serve as a heat exchanger for one or more components on one or more of said computer boards;~~

~~means for holding one or more of the cold plates in thermal communication with one or more of said computer boards;~~

~~means for passing a fluid through each of the one or more cold plates so the one or more cold plates transfer heat energy from the one or more computer boards to the fluid; and~~

~~means for transferring heat away from the fluid.~~

13. (Currently amended) The system for cooling ~~at least one computer component of~~ claim 12, wherein said means for supplying cooling fluid further comprises means for controlling the amount of cooling fluid supplied to each of the plurality of means for absorbing heat ~~passing a fluid through each of the one or more cold plates comprises:~~

**PATENT**

Atty Docket No.: 100110202-1

App. Ser. No.: 10/062,443

~~a supply line to supply said fluid between said one or more cold plates and said means for transferring heat away from the fluid; and~~

~~one or more pumps to circulate the fluid through at least one of:~~

~~said one or more cold plates;~~

~~said means for transferring heat away from the fluid; and said supply line.~~

14. (Currently amended) The system for cooling at least one computer component of claim ~~[[12]]~~13, wherein said means for transferring heat away from the fluid comprises further comprising:

means for electronically controlling the means for controlling the amount of cooling fluid supplied to each of the plurality of means for absorbing heat ~~a second heat exchanger adapted to draw heat from the fluid and transfer it to a medium.~~

15. (Currently amended) The system for cooling at least one computer component of claim 12, further comprising:

means for cooling the cooling fluid ~~an electronic controller configured to modulate the operation of the system.~~

16 and 17. (Cancelled).

## PATENT

Atty Docket No.: 100110202-1  
App. Ser. No.: 10/062,443

18. (Currently amended) The system for cooling at least one computer component of claim 12, further comprising:

~~means for monitoring temperature to monitor the power consumption of a computer component.~~

19. (Currently amended) The system for cooling at least one computer component of claim ~~[[18]]~~ 12, further comprising:

means for monitoring power consumption of the plurality of computer components wherein said means to monitor the power consumption of a computer component is such that the power consumption of each computer board may be measured.

20. (Currently amended) A method for cooling at least one computer component, said at least one computer component being thermally attached to a cold plate in a system for cooling comprising at least one cold plate adapted to transfer heat from at least one computer component to a fluid, and a supply line to supply a fluid to, and from, a heat exchanger, said method comprising the steps of:

~~providing a housing to receive removable computer components;~~

~~providing at least one cold plate within the housing to absorb heat from at least one computer component, wherein said cold plate is configured to allow fluid to pass through the cold plate;~~

supplying cooling fluid into the cold plate from a supply line for supplying cooling fluid into a plurality of cold plates;

## PATENT

Atty Docket No.: 100110202-1  
App. Ser. No.: 10/062,443

varying the amount of cooling fluid supplied into the cold plate based upon at least one detected condition; and

circulating ~~[[a]]the cooling~~ fluid within the housing and through the cold plate and then away from out of the cold plate such that heat is absorbed from the at least one computer component ~~cold plate~~ into the cooling fluid circulating in the cold plate.

21. (Currently amended) The method of claim 20, further comprising the steps of:  
circulating the cooling fluid through a heat exchanger such that the heat exchanger operates to absorb heat from the cooling fluid and transfer the heat into a medium to thereby cool the cooling fluid.

22. (Currently amended) The method of claim 20, ~~further comprising the step of:~~  
wherein the step of varying the amount of cooling fluid supplied into the cold plate further comprises using one or more valves to modulate vary the amount of cooling fluid supplied to the cold plate circulation within the system.

23. (Currently amended) The method of claim 20, further comprising the step of:  
monitoring ~~[[the]]~~ a temperature within the system of at least one of the cooling fluid, the cold plate, and the at least one computer component; and  
wherein the step of varying the amount of cooling fluid supplied into the cold plate further comprises varying the amount of cooling fluid supplied into the cold plate based upon the monitored temperature.

## PATENT

Atty Docket No.: 100110202-1  
App. Ser. No.: 10/062,443

24. (Currently amended) The method of claim 20, further comprising ~~the step of:~~  
monitoring the power consumption of the at least one or more computer component  
boards; and

wherein the step of varying the amount of cooling fluid supplied into the cold plate  
further comprises varying the amount of cooling fluid supplied into the cold plate based upon  
the monitored power consumption.

25. (Currently amended) The method of claim 20, further comprising ~~the step of:~~  
~~modulating the circulation of the fluid through the system, in response to a monitoring~~  
~~step anticipating a level of heat generation by the at least one computer component; and~~

wherein the step of varying the amount of cooling fluid supplied into the cold plate  
further comprises varying the amount of cooling fluid supplied into the cold plate based upon  
the anticipated heat generation level.

26. (Currently amended) The method of claim 21, further comprising ~~the step of:~~  
~~modulating the operation of the heat exchanger, in response to a monitoring step to~~  
~~thereby vary a level of heat exchange between the cooling fluid and the heat exchanger.~~

27. (Currently amended) The method of claim 20, further comprising ~~the step of:~~  
~~detecting the number of the at least one one or more computer components operating~~  
~~within the system;~~

~~monitoring the operation of the at least one one or more computer components~~  
~~operating within the system;~~



**PATENT**

Atty Docket No.: 100110202-1

App. Ser. No.: 10/062,443

~~modulating the cooling of the system in response to the step of detecting the number of the one or more computer components operating within the system; and~~

~~modulating the cooling of the system in response to the step of monitoring the operation of the one or more computer components operating within the system and~~

wherein the step of varying the amount of cooling fluid supplied into the cold plate further comprises varying the amount of cooling fluid supplied into the cold plate based upon the monitored operation of the at least one computer component.

28. (New) The method of claim 20, wherein the at least one computer component comprises a plurality of computer components thermally attached to a plurality of cold plates, said method further comprising:

supplying cooling fluid to each of the plurality of cold plates; and

individually varying the amount of cooling fluid supplied into each of the plurality of cold plates.

29. (New) The method of claim 28, wherein the step of individually varying the amount of cooling fluid supplied further comprises manipulating a plurality of valves positioned along the supply line to individually vary the amount of cooling fluid supplied to each of the plurality of cold plates.